

Amendment To The Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-20 Cancelled

21. (New) A heat integrated distillation column comprising:
- an outer shell with an upper and a lower end;
 - a first inner volume within the outer shell;
 - a second inner volume within the outer shell, the first and the second inner volumes being separated by a dividing wall and being in heat exchanging contact with one another through the dividing wall;
 - a heat exchanger fluidly connected to one of the first and second inner volumes to further exchange heat between the first and second inner volumes without transferring mass between the first and second inner volumes, wherein the heat exchanger is fluidly connected with one of either the first or the second inner volume.
22. (New) The heat integrated distillation column of claim 1 wherein the first inner volume is an enriching section and the second inner volume is a stripping section.
23. (New) The heat integrated distillation column of claim 2 further comprising a plurality of trays with downcomers positioned within the first inner volume, the second inner volume, or both the first and second inner volume.
24. (New) The heat integrated distillation column of claim 3 wherein the heat exchanger is positioned at the downcomer of one of the plurality of trays.
25. (New) The heat integrated distillation column of claim 3 wherein the heat exchanger is positioned between the plurality of trays.

26. (New) The heat integrated distillation column of claim 2 further comprising a plurality of packing within the first inner volume, the second inner volume, or both the first and second inner volume.

27. (New) The heat integrated distillation column of claim 6 wherein the packing comprises at least one of structured packing or random packing.

28. (New) The heat integrated distillation column of claim 2 wherein the enriching section is provided with a plurality of trays and downcomers and the stripping section is provided with at least one of structured packing or random packing.

29. (New) The heat integrated distillation column of claim 2 wherein the stripping section is provided with a plurality of trays and downcomers and the enriching section is provided with at least one of structured packing or random packing.

30. (New) The heat integrated distillation column of claim 2 wherein the dividing wall is a generally straight wall intersecting portions of the outer shell such that the outer shell is portioned into the first and second inner volumes.

31. (New) The heat integrated distillation column of claim 2 wherein the first and second inner volumes have cross-sectional areas that are inversely related such that as the cross-sectional area of the enriching section generally decreases from the lower end to the upper end of the outer shell, the cross-sectional area of the stripping section generally increases from the lower end to the upper end of the outer shell.

32. (New) The heat integrated distillation column of claim 1 wherein the outer shell is cylindrical and the heat integrated distillation column further comprises an inner tube positioned within and concentric with the outer shell, such that the dividing wall is created by the inner tube thereby defining one of the first and second inner volumes within the inner tube and the other of the first and second inner volumes in the annular space between the inner tube and outer shell.

33. (New) The heat integrated distillation column of claim 1 wherein the simultaneous general increase and general decrease of the cross-sectional areas occurs in a step-wise configuration.

34. (New) The heat integrated distillation column of claim 1 wherein the heat exchanger comprises a plurality of heat exchangers along the dividing wall between an upper and lower end of the distillation column.

35. (New) The heat integrated distillation column of claim 1 wherein the heat exchanger is fluidly connected to the volume configured to operate at a higher temperature.

36. (New) The heat integrated distillation column of claim 1 wherein the heat exchanger is fluidly connected to the volume configured to operate at a lower temperature.

37. (New) The heat integrated distillation column of claim 1 wherein the heat exchanger comprises at least one of a panel or tubular construction.

38. (New) The heat integrated distillation column of claim 1 wherein the heat exchanger comprises at least one:

- a smooth plate;
- a textured plate;
- a smooth tube;
- a textured tube;
- a coil;
- a flat plate;
- a dimple plate;
- a dimpled tube;
- a finned plate;
- a finned tube;
- a vertically oriented corrugated sheet; and

a corrugated plate.

39. (New) The heat integrated distillation column of claim 1 further comprising vapor-liquid disengagement structure at the heat exchanger.

40. (New) The heat integrated distillation column of claim 19 wherein the vapor-liquid disengagement structure comprises at least one of:

fins;

vanes;

corrugated structure packing sheet; and

dumped packaging rings.

41. (New) A method for use with a heat integrated distillation column having an outer shell, wherein an outer shell includes a first volume and a second volume in heat exchanging contact with one another through a dividing wall, the method comprising:

providing a heat exchanger to further exchange heat between the first and second volumes wherein the heat exchanger is fluidly connected with one of the first or the second volumes.

42. (New) The method of claim 21, further comprising: moving contents through the heat exchanger to facilitate further transfer heat from the fluidly connected first or second volume to the other volume without transferring mass.

43. (New) A process for distilling a material comprising one of the group consisting of liquefied air, an organic mixture, or an aqueous mixture, said process comprising:

distilling the material using a heat integrated distillation column of claim 1.